

# Addressing Coastal Erosion and Sea Level Rise in the Monterey Bay National Marine Sanctuary

MBNMS Advisory Council Meeting -- 8/19/10  
Brad Damitz, MBNMS



# Problem

Shoreline eroding, impacting development and ecology,  
degrading local economy and public welfare





Santa Cruz

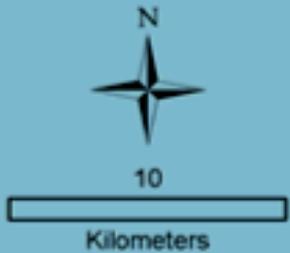


Monterey

# Coastal Erosion/Armoring in the Sanctuary

- Concern about site-specific and cumulative impacts of increased armoring and loss of beaches
- Sanctuary's regulatory role with coastal armoring
- Status quo has been site by site “emergency” approach to responding to erosion issues
- Joint Management Plan Review-- a regional interagency approach in Sanctuary's *Coastal Armoring Action Plan*





Monterey Bay National Marine Sanctuary

- Santa Cruz
- Aptos
- Rio del Mar
- Watsonville
- Castroville
- Marina
- Sand City
- Seaside
- Monterey
- Salinas

SANTA CRUZ COUNTY

MONTEREY COUNTY

Armoring data as of 1998, from *Living with the California Coast* by Griggs and others (2005).

# Impacts of Coastal Armoring

- Vary greatly
- Construction and long-term impacts
- Main impacts recognized
  - Visual Effects
  - Placement Loss
  - Access Issues
  - Loss of Sand Supply from Eroding Cliffs
  - Passive Erosion
  - Active Erosion
  - Biological Impacts

# Visual Effects



# Loss of Beach due to Placement



**Riprap in  
Santa Cruz**

# Reduced Public Access to Beach



# Loss of Sand Supply from Eroding Cliffs



# Passive Erosion



# Biological Impacts



# MBNMS Coastal Armoring Action Plan

## Goal:

Devise a regional approach to minimize impacts from coastal armoring, while recognizing the issue of protecting public and private property.

## Issue Background:

- Coastline is actively eroding
- Increase in coastal development
- Erosion presents a threat to development/infrastructure
- Armoring used extensively to protect development/infrastructure from erosion, or retain soil
- Armoring in the MBNMS



# MBNMS Coastal Armoring Action Plan

## Action Plan Strategies

Strategy CA-1: Issue Characterization and Needs Assessment

Strategy CA-2: Develop and Implement Regional Approach

Strategy CA-3: Permit Program Improvements

Strategy CA-4: Program Implementation and Training



# MBNMS Coastal Armoring Action Plan

## Strategy CA-1 Issue Characterization and Needs Assessment

- Characterize issue/identify data gaps
- Produce GIS maps and database
- Compile and analyze data
- Develop and implement long-term monitoring program



# **MBNMS Coastal Armoring Action Plan**

## Strategy CA-2 Develop and Implement Regional Approach

- Develop hierarchy of preferred responses to erosion
- Develop guidelines for a sub-regional planning approach
- Identify sub-regions
- Develop specific planning guidelines for each subregion
- Reduce need for emergency permits
- Pursue Pilot Program for Alternatives to Coastal Armoring



# **MBNMS Coastal Armoring Action Plan**

## Strategy CA-3 Permit Program Improvements

- Integrate State and Federal planning programs
- Develop consistent permitting conditions
- Clarify threshold for MBNMS review of projects
- Incorporate MBNMS standards into agency permits
- Improve information sharing among agencies



# **MBNMS Coastal Armoring Action Plan**

## Strategy CA-4 Program Implementation and Training

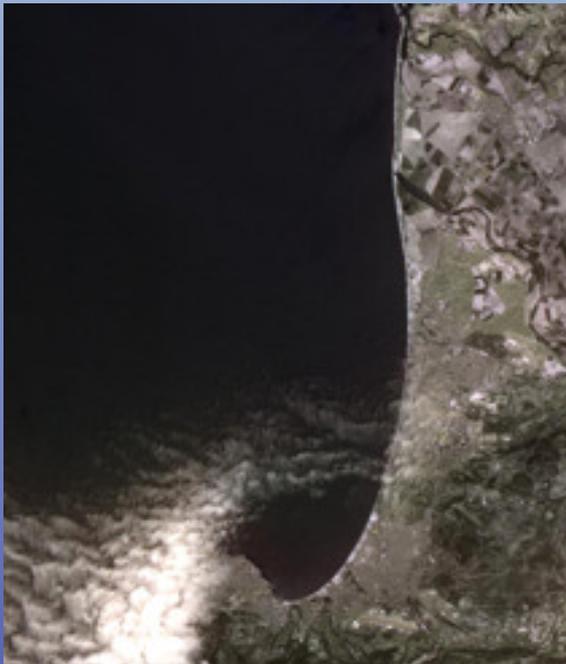
- Conduct needs assessment
- Conduct outreach to agencies and property owners
- Review/comment on local land use decisions updates
- Review/comment on LCP updates



# Southern Monterey Bay Coastal Erosion Workgroup

Initiated by MBNMS and City of Monterey with support from Congressman Farr

Initial effort in implementing MBNMS *Coastal Armoring Action Plan* --collaborative regional effort to address armoring and erosion issues in Southern Monterey Bay



Sub-region between Moss Landing and Wharf II

# Southern Monterey Bay Coastal Erosion Workgroup Participants

- AMBAG
- City of Monterey
- City of Sand City
- California Coastal Commission
- Monterey Bay National Marine Sanctuary
- California State Parks
- California Resources Agency
- California Dept. of Boating and Waterways
- U.S. Army Corps. Of Engineers
- Monterey Regional Water Pollution Control Agency
- Local Residents
- U.S. Geological Survey
- Marina Coast Water District
- Naval Postgraduate School
- CSUMB
- UC Santa Cruz
- Surfrider Foundation
- Local, regional, and State Elected Officials
- Project Consultants and Engineers



## Workgroup Goals:

1. Compile/analyze information on erosion and threats to structures
2. Identify and assess options available for responding to erosion
3. Develop a proactive regional Shoreline Management Plan with recommendations for responding to coastal erosion while minimizing socioeconomic and environmental impacts

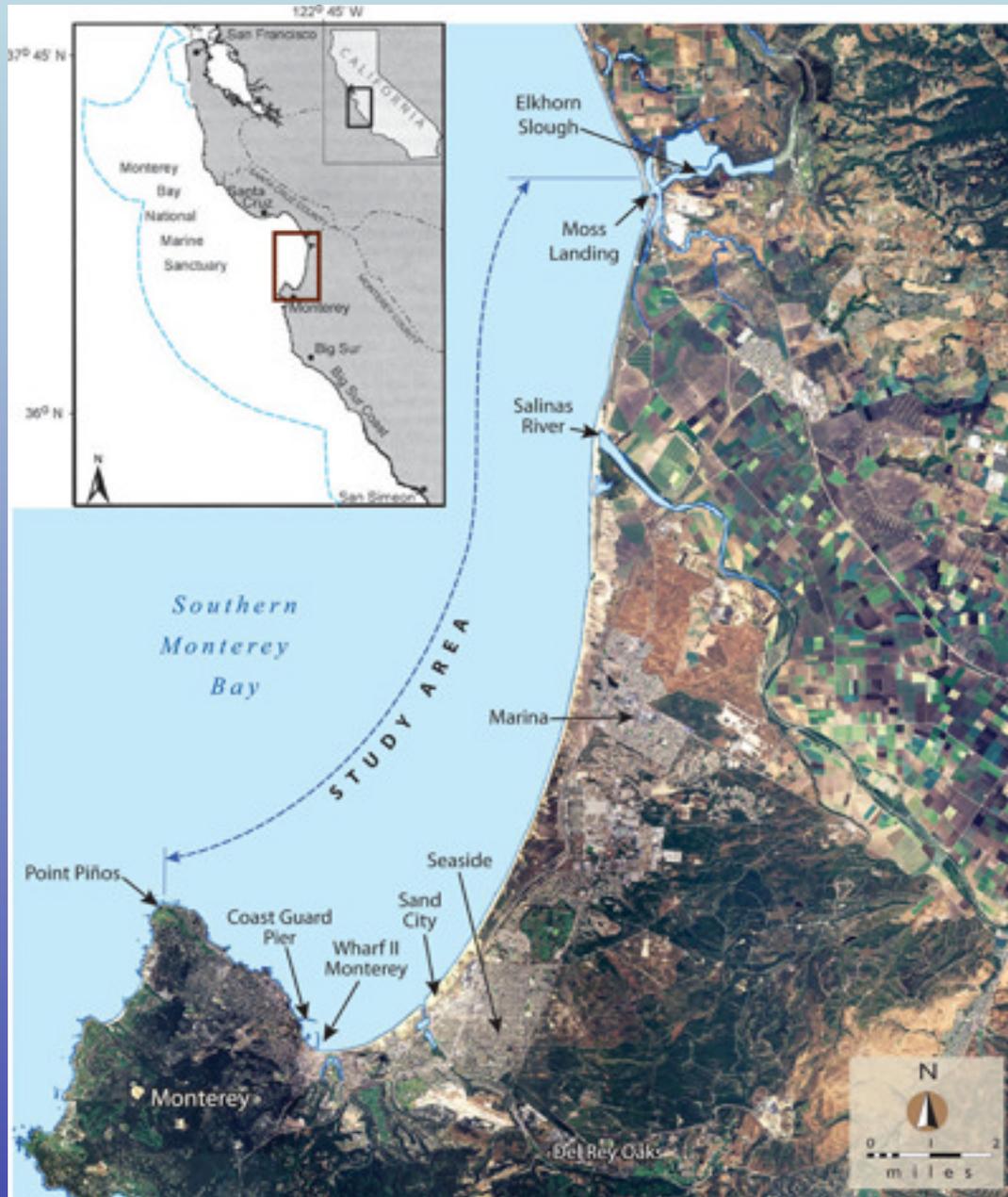


# Accomplishments to Date

1. Compiled and analyzed existing information on erosion rates and corresponding threats
2. Identified and completed prioritization of critical erosion sites
3. Identified range of options available for responding to erosion, and completed an initial assessment—In-depth analysis underway
4. Conducted public workshops
5. Provided input on Coastal RSM Plan



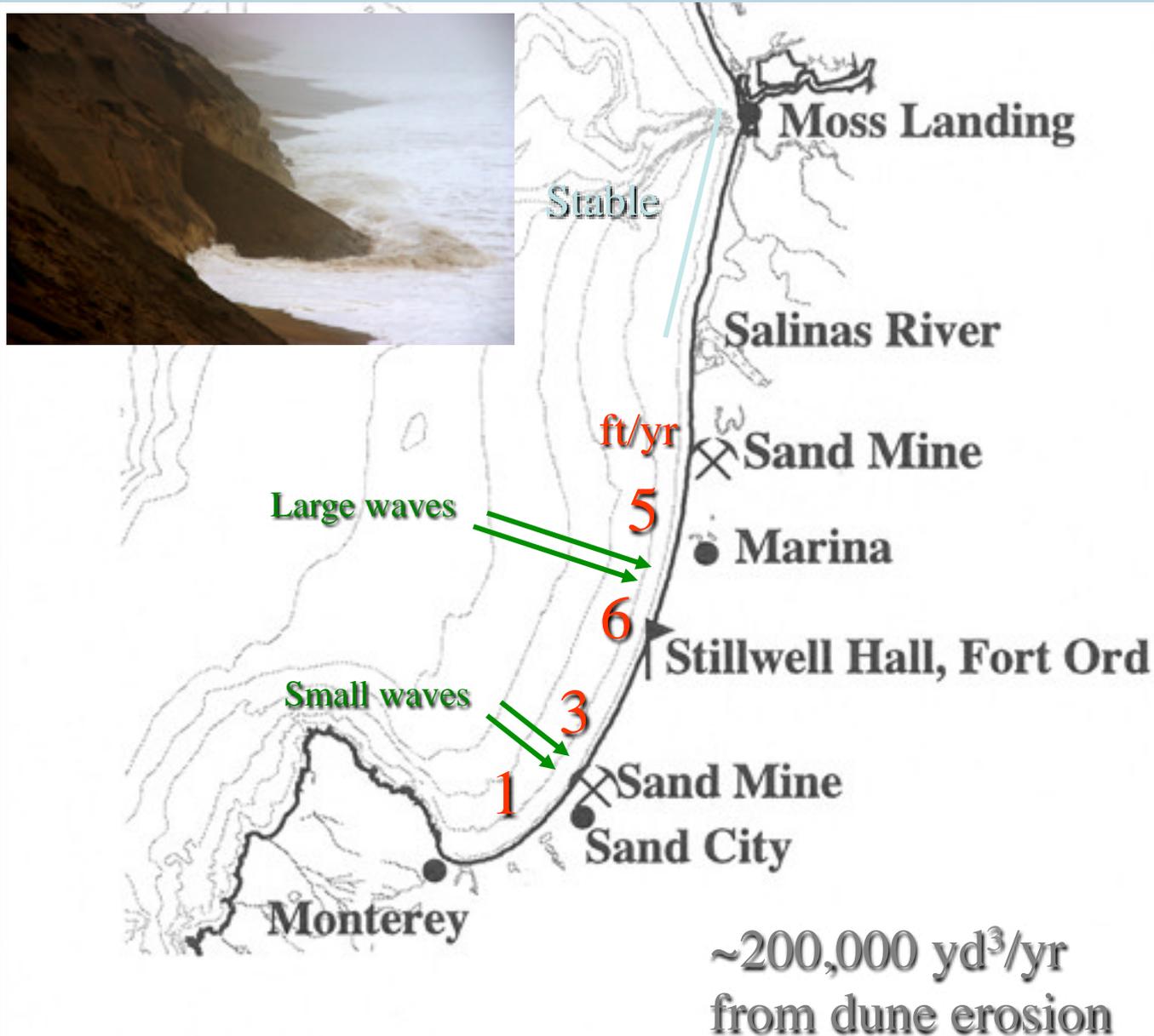
# Littoral Cell/Regional Geomorphology



# Salinas River Discharge



# Coastal Dune Bluff Erosion



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Erosion Rate ~1 ft/yr

Copyright (C) 2002-2004 Kenneth & Gabrielle Adelman, California Coastal Records Project

# Del Monte Beach Townhomes



**Monterey Interceptor**

Erosion Rate ~1-3 ft/yr



Erosion Rate  $\sim 1.5$  ft/yr

Copyright (C) 2002-2004 Kenneth & Gabrielle Adelman, California Coastal Records Project

# Ocean Harbor House



Erosion Rate  $\sim 1.5$  ft/yr

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# Monterey Beach Resort



Erosion Rate ~3.0 ft/yr

# Seaside Pump Station



Erosion Rate ~3.5 ft/yr

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# Tioga Avenue, Sand City



# Facilities at Marina



Sanctuary Beach  
Resort

Marina Coast Water  
District buildings

Reservation  
Road

Erosion Rate ~5.5 ft/yr

# Dredge Sand Mining Marina



# Dredge Sand Mining Marina

Dredge pond filled during winter  
~200,000 yd<sup>3</sup>/yr loss from system



January 2008

Final Draft Report  
Subject to Revision

# California Coastal Erosion Response to Sea Level Rise - Analysis and Mapping

Prepared  
for the

Pacific Institute

Prepared  
by

Philip Williams & Associates, Ltd.  
March 11, 2009

## Download

- Climate Action Team
- CA Energy Commission
- PWA ([www.pwa-ltd.com](http://www.pwa-ltd.com))



Project Study Area



Houses in Isla Vista threatened by Sea Cliff Erosion, June 2006  
Photo by David Revell



Waves flooding ocean front road in Santa Cruz, February 2008  
Photo by David Revell



## Questions

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# Hazard Maps



“Not for planning purposes”

# Accomplishments to Date

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# Entire List of Alternatives Considered

1. Fee Simple Acquisition:
2. Conservation Easements:
3. Present Use Tax:
4. Transfer of Development Credit
5. Rolling Easements
6. Removal/Relocation Managed Retreat
7. Structural or Habitat Adaption
8. Buffer Development (setback)
9. Beach Level Development (setback)
10. Controlling Surface Run-off
11. Controlling Groundwater
12. Reservoir and Debris Basin
13. Sand Mining
14. Harbor By-Passing
15. Back-Passing
16. Subaerial Placement
17. Artificial Seaweed
18. Native Plants
19. Geotextile Core
20. Nearshore Placement
21. Dredge Sand from Deep or Offshore Deposits
22. Added Courser Sand than Native
23. Opportunistic Sand
24. SCOUNP Efforts
25. Canyon Interception
26. Rip-Current Interruption
27. Inter-littoral Cell Transfers
28. Berms/Beach Scraping
29. Perched Beaches
30. Groins
31. Breakwaters
32. Dune Nourishment
33. Delta Enhancement
34. Headland Enhancement
35. Geotextile Groins
36. Branch Box Breakwaters
37. Floating Breakwaters
38. Coir Logs
39. Submerged Breakwaters
40. Kelp Forest Restoration
41. Beach Dewatering
42. Pressure Equalizing Modules
43. Seawalls
44. Revetments
45. Cave Fills
46. Gabions
47. Mixed Structures
48. Cobble Nourishment
49. Dynamic Revetments
50. Geotextile Revetment
51. Floating Reefs
52. Rubber Dams
53. Visually Treated Walls or Revetments
54. Cessation of Sand Mining
55. Sand Fencing/Dune Guard Fencing

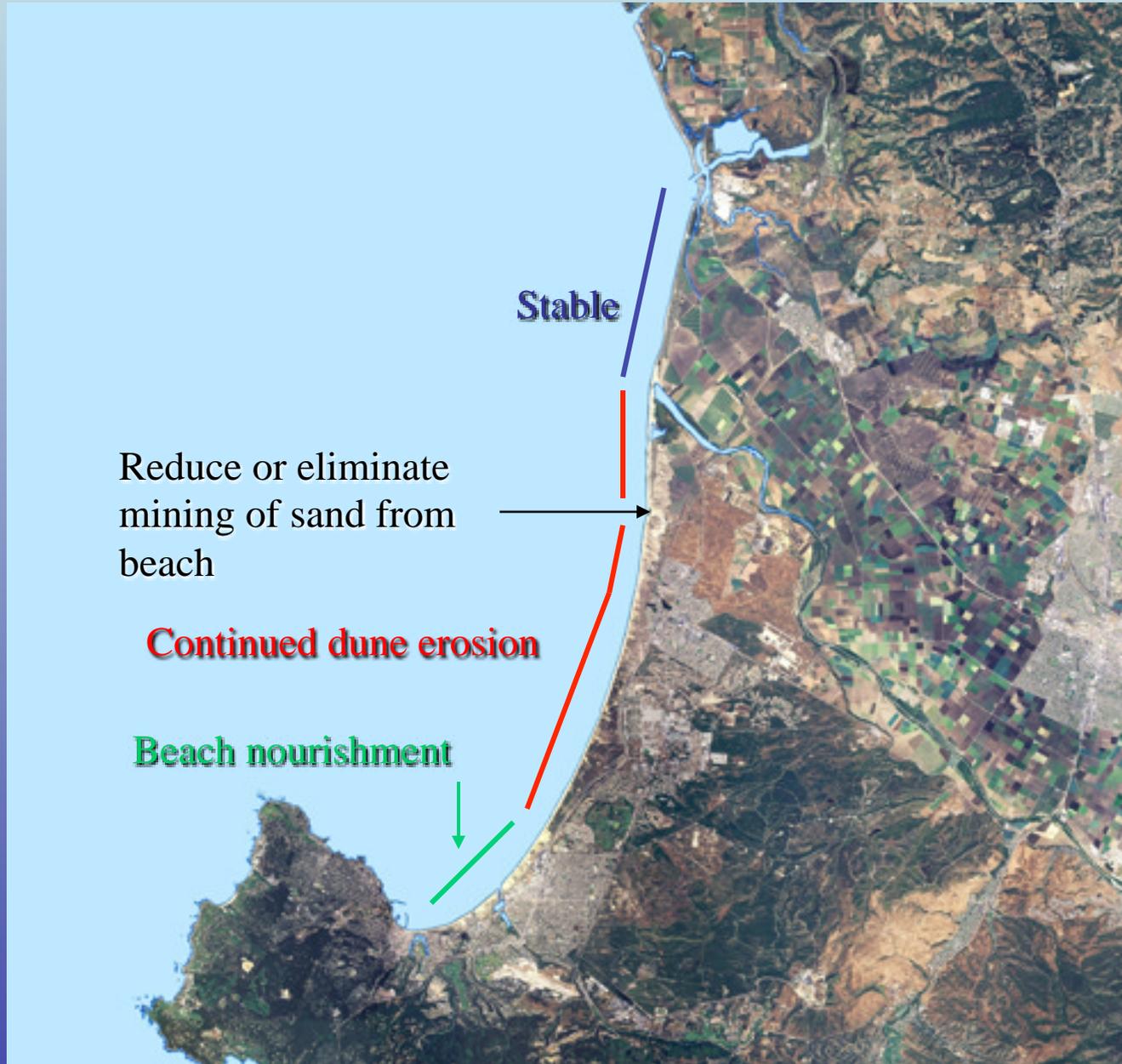
# Narrowing down of field of alternatives

**28 options were dropped throughout the process because:**

1. Not economically feasible
2. Would cause substantial environmental impact
3. Has unacceptable visual impacts to shoreline
4. Causes significant public safety or recreational impacts
5. Not technically feasible



# Summary of RSM Approaches



# Categories of Alternatives

- Land Use Planning
- Non-structural
- Structural
- Time Horizons –
  - Immediate 0-5 years
  - Short 5-25 years
  - Medium 25-50 years
  - Long 50-100+



# Land Use Planning Tools

- **Rolling Easements**
- **Managed Retreat**
- Transfer of development credit
- Conservation Easements
- Present use tax
- Fee Simple Acquisition
- Structural or Habitat Adaptation
- Setbacks for Bluff top Development
- Setbacks + Elevation for Beach Level Development



**Generally issues are: high upfront costs, long implementation timelines, limited application, or put off the problem until a later date**

# Non Structural

- Sand Mining cessation
- SCOUP/ Opportunistic Sand
- **Beach Dewatering**
  - Active Pumping
  - Passive – PEMs
  - Desalination wells
- Beach Nourishment



**General approach is: increase natural sand supply, accelerate natural accretion processes, or augment sand volumes**

# Structural Tools

- Revetments
- Seawalls
- Perched Beaches
- **Groins**
- Breakwaters
- **Artificial Reefs/**  
Submergent  
Breakwaters/ Low  
Crested Structures



**\$5.3 million sand mitigation fee**  
for lost recreational beach over  
the life of the seawall

# Southern Monterey Bay Coastal Erosion Workgroup

## Steps Ahead

- In-depth analysis of alternatives by outside consultant/experts
  - ✓ Scientific and environmental evaluation
  - ✓ Technical and engineering feasibility
- Further evaluation of regulatory/policy/political considerations
- Development of proactive plan with regional and site-specific responses for near and long-term
- Identify potential funding sources and determine role of various parties in project implementation

# QUESTIONS?

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